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CORNING INCORPORATED
SP-TI-3-1
CORNING, NY 14831

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte DANA C. BOOKBINDER,
STEVEN A. DUNWOODY, RICHARD M. FIACCO, and
ERIC M. JOHNSON,
Appellants

Appeal 2007-3037
Application 09/941,383[1]
Technology Center 1700

Decided: August 18, 2008

Before BRADLEY R. GARRIS, ADRIENE LEPIANE HANLON, and MARK NAGUMO, *Administrative Patent Judges*.

NAGUMO, *Administrative Patent Judge*.

DECISION ON APPEAL

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[1] Application 09/941,383, filed 28 August 2001, titled *Furnace Assembly for Heating an Optical Waveguide Preform* (the disclosure is referred to as the "383 Specification; it is cited as "Spec."). The real party in interest is listed as Corning Incorporated (Amended Brief on Appeal filed 3 October 2005 ("Br."), 1).

A. Introduction

Dana C. Bookbinder, Steven A. Dunwoody, Richard M. Fiacco, and Eric M. Johnson ("Bookbinder") timely appeal from the final rejection of claims 1-12, 38-42, 47, and 48 under 35 U.S.C. § 103(a). The other pending claims, claims 13-26, 29-37, 44-46, have been withdrawn from consideration and are not before us. (Br. 2.) We AFFIRM.

Procedural Background

This is the second time this case has reached a merits panel of the Board of Patent Appeals and Interferences ("Board"). A brief review of the appeal history provides context for our discussion of this case.

During prosecution the Examiner rejected claims 1-12, 38-42, 47, and 48 under 35 U.S.C. § 103(a) over Japanese patent publication JP2000-44269A ("Koaizawa," then referred to by the Examiner as "Sugiyama"), in view of other references.[2] Koaizawa qualifies as prior art under 35 U.S.C. § 102(b). However, rather than obtaining a translation of this document, the Examiner relied on U.S. Patent 6,543,257 B1 (the "257 patent"), based on application 09/545,673, filed 7 April 2000, which issued to Hisashi Koaizawa et al. on 8 April 2003, after the filing date of the 383 Application. The 257 patent is therefore prior art under § 102(e), and is subject to antedation by, for example, a declaration filed under 37 C.F.R. § 131.

[2] (Office action mailed 19 January 2005 ("Final Rejection"), at 2 (citing a prior office action for details of the rejection).

Bookbinder timely filed its appeal brief on 3 October 2005 ("Br."). An Examiner's Answer was mailed on 19 December 2005. Bookbinder did not file a Reply Brief in response to the Examiner's Answer.

The Board found that the 257 patent was not an equivalent to the untranslated Japanese language Koaizawa reference, and that the Examiner had relied on portions of the text of the 257 patent to reject the claims. (Remand, mailed 8 August 2006, at 2-4.) In order to avoid potential ambiguities, the Board remanded the case to the Examiner for clarification of the basis of rejection. The Board required that the rejection, if maintained, be based on Koaizawa, with a human translation made of record; or that the rejection be based on the 257 patent, in order to afford Bookbinder the opportunity to antedate the reference. (Remand 4-5.)

The Examiner promptly obtained a translation of Koaizawa, which was mailed to Bookbinder on 8 September 2006. The Examiner then mailed a second Examiner's Answer on 22 September 2006, in which references to the 257 patent were replaced by references to Koaizawa—more precisely, to the translation of Koaizawa. On brief review, the second Examiner's Answer is largely—but not completely—the same as the first Examiner's Answer. All citations henceforth are to the second Examiner's Answer mailed on 22 September 2006 ("Ans.")

Bookbinder did not file a Reply Brief in response to the second Examiner's Answer.

Technical Background

The subject matter on appeal relates to a furnace for heating an optical waveguide preform. An optical fiber is a now-familiar instance of an optical

waveguide. An optical fiber is a fine filament that is typically drawn from a much thicker "preform" of specially prepared glass or doped silica that is held in a furnace, the atmosphere of which is carefully controlled. It is desirable to prevent atmospheric oxygen, water, and other contaminants from contacting the freshly drawn fiber. The claimed invention is said to accomplish these goals efficiently, reducing or minimizing the amount of process gas needed, and reducing or minimizing detrimental effects of contaminating atmospheric gases.

The claimed subject matter is illustrated in Figure 1 from the 383 Specification, which is reproduced in part on the following page; labels not necessary to this Decision have been removed:

{383 Specification Figure 1}[3]

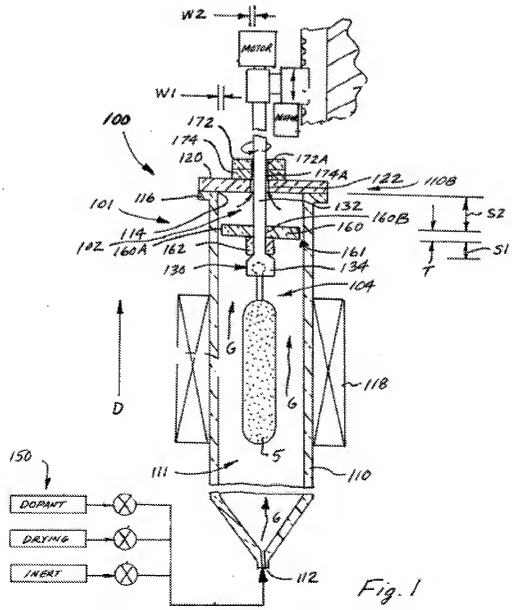

Fig. 1

{Figure 1 is said to show a furnace assembly.}

[3] The text in curly braces preceding and following the Figures is provided to ensure compliance with section 508 of the U.S. Rehabilitation Act for publication of this Decision on the USPTO website pursuant to the Freedom of Information Act. It is not part of the Decision.

Claims 1-5 and 7-9 are illustrative of the issues necessary to resolve this appeal and are reproduced below. (Square bracketed labels to elements labeled in Figure 1 have been added to illustrate, but not to limit, the claimed subject matter; emphasis and indentation added.) (Claims App., Br. 12-13.)

1. A furnace assembly [100] for heating an optical waveguide preform [5], the furnace assembly comprising:

a furnace [101] including:

a muffle tube [110] defining a furnace passage [111], the furnace passage having a length extending from a first end [112] to a second end [114];

a top plate [120] mounted and resting on a terminal end of the muffle tube at the second end [114]

and an central opening [122] defined in the top plate,

said top plate [120] including a lower surface in contact with the terminal end [114] and an upper surface opposite the lower surface;

a heating device [118] operative to heat the furnace passage;

a process gas supply [150] providing a process gas to the furnace passage;

a handle [130] disposed in the furnace passage [111], said handle including a coupling portion [130|134] which is adapted to hold the waveguide preform [5] and the handle [130|132] extends through the exit opening;

a *flow shield* [160] positioned between the first [112] and second [114] ends and extending across the furnace passage [111] between the handle [132] and the muffle tube [110], the flow shield [160] arranged and configured to restrict flow of the process gas [G] from the first end [112] to the second end [114] of the furnace passage; and

a *washer* [172, 174] mounted about the handle [132],

contacting the upper surface of the top plate [120] and covering a portion of the central opening [122].

2. The furnace assembly of Claim 1 wherein the flow shield [160] defines an isolation chamber [102] between the flow shield [160] and the second end [114].

3. The furnace assembly of Claim 1 wherein the flow shield [160] has a peripheral edge [160A] adjacent the muffle [110], and the peripheral edge and the muffle define a marginal gap therebetween having a width of between about 2.5 mm and 25 mm.

4. The furnace assembly of Claim 1 wherein the flow shield [160] has a thickness greater than about 6 mm.

5. The furnace assembly of Claim 1 wherein: the handle [130] extends through the top plate [120] at the second end [114] of the passage; and the flow shield [160] is disposed between the coupling portion [134] and the top plate [120].

7. The furnace assembly of Claim 1 wherein the handle [130] includes a spacer [162] longitudinally separating the flow shield [160] from the coupling portion [134].

8. The furnace assembly of Claim 7 wherein the spacer [162] separates the flow shield [160] from the preform [5] a distance of at least 50 mm.

9. The furnace assembly of Claim 1 wherein the flow shield [160] is formed of at least one material selected from the group consisting of fused silica, fused quartz, ceramic, silicon carbide, ceramic coated fused silica, and ceramic coated fused quartz, and combinations thereof.

Claims 39 and 40, which depend from claim 38, which in turn depends from claim 1, require that the furnace assembly include a drive assembly to translate (claim 39) or rotate (claim 40) the handle [130] and flow shield [160] relative to the muffle [110].

The Rejection

Claims 1-12, 38-42, 47, and 48 stand rejected under 35 U.S.C. § 103(a) in view of the combined teachings of Koaizawa[4], Drouart[5], Kaiser[6], Ryoji[7], Gilbreath[8], Haney[9], and Collins[10].

B. Findings of Fact (FF)

Findings of fact throughout this decision are supported by a preponderance of the evidence of record.

The 383 Disclosure

1. According to the 383 Specification, in embodiments of the present invention:

> a furnace assembly adapted to heat an optical fiber preform includes a muffle tube including a passage. A top plate is

[4] Hisashi Koaizawa, et al., *Dehydrating and Transparent Vitrifying Apparatus for Porous Optical Fiber Preform*, JP P2000-44,269A (1999) (English translation prepared for the USPTO, of record.)

[5] Alain Drouart, et al., *Device for Drawing Down an Optical Fiber Preform*, U.S. Patent 5,931,984 (1999).

[6] Peter Kaiser, *Method for Drawing Fibers*, U.S. Patent 4,030,901 (1977).

[7] "Ryoji": Koichi Harada, et al., *Furnace for Dehydration and Sintering of Optical Fiber Preform*, JP Hei 02-212,325 (1990).

[8] Donald R. Gilbreath and Melvin O. Hendricks, *Fluid Coupling and Assembly,* U.S. Patent 6,447,017 B1 (10 September 2002).

[9] Eugene A. Haney and Fred P. Partus, *Method of Supplying Fluid to a Rotating Tube*, U.S. Patent 4,347,069 (1982).

[10] Charles C. Collins et al., *Transdermal Cell Test Matter Volume-Adjustment Device*, U.S. Patent 5,408,865 (1995).

> mounted on an end of the tube. A gas supply is provided for supplying process gas to the passage. A handle traverses the top plate and is adapted to suspend the preform in the passage. A flow shield is positioned in the passage between the preform and the top plate. The flow shield is configured to enable restriction of the gas.

(Spec. 2:24-30.)

2. In an embodiment, the preform **5** is said to be held and suspended by a coupling portion **134** of the handle **130**, which in turn is described as having a handle body **132** that extends through a central opening **122** in top plate **120**, which covers the top end **114** of the muffle tube **111**. (Spec. 4:25-31 and 5:3-7.)

3. In embodiments, process gas **G** is provided by a supply system **150** through inlet opening **112** to the passage **111** and is said to flow up the passage and out of the furnace through opening **122** and through any gaps between the top plate **120** and the flange **116**. (Spec. 5:16-23.)

4. According to the 383 Specification, a flow shield **160** may be mounted on handle body **132** between the preform **5** and the upper end **114** of the passage. (Spec. 5:29-34.)

5. The flow shield is said to be made of materials such as fused quartz, fused silicon, ceramic, or silicon carbide. (Spec. 6:11-12.)

6. The flow shield is said to have a shape that is complementary to the shape of the passage **111** (Spec. 5:31-32) and to be optionally secured to the handle body **132** (*id.* at 6:3-4).

7. Moreover, in embodiments, the flow shield is said to define an "annular restrictive flow passage **161**" between it and the muffle 110, and to

"effectively divide the passage **111** into an upper isolation chamber **102** above the flow shield **160** and a lower process chamber **104** below the flow shield **160**," the chambers **102** and **104** being connected by the restrictive flow passage **161**. (Spec. 6:5-10.)

8. In the words of the 383 Specification, "[a] plurality of washers **172, 174** are positioned over the opening **122** with the candle body **132** extending through central openings **172A**, **174A** formed therein. Preferably, the openings **172A**, **174A** are sized to fit loosely (slip fit) against the handle body **132**." (Spec. 6:21-24.)

9. The washers **172**, **174** are said to be preferably formed from the same sorts of materials as the flow shield. (Spec. 6:24-25.)

10. Figures 1 through 9 of the 383 Specification illustrate embodiments of the furnace assembly having flow shields with various configurations, such as doubled, separated by a space (Fig. 2); with a collar, creating a convoluted path for the process gas (Figs. 3, 8); a thick stack (Fig. 4); three-dimensional (Fig. 7)). (Spec. 6-12.)

Koaizawa[11]

11. Koaizawa describes an apparatus for dehydrating and vitrifying optical fiber porous preforms by heat treatment in a controlled atmosphere. (Koaizawa 3: [0001].)

12. Koaizawa illustrates and describes a conventional dehydrating transparent vitrifying apparatus of the prior art in Figure 11, which is reproduced below:

[11] References are to the English translation, of record.

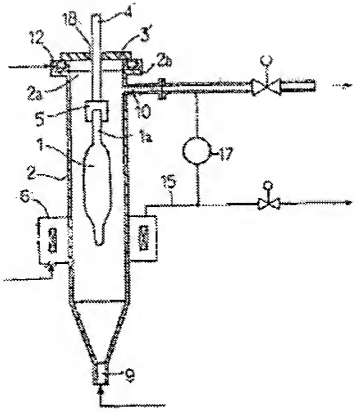

Figure 11

{Koaizawa Figure 11 is said to show a prior art furnace.}

13. Such an apparatus is said to comprise a furnace core tube (2), an upper lid (3') through which a shaft (4') that can be raised or lowered is fitted, to which is secured an optical fiber preform (1) via a preform holder (5). (Koaizawa 3-4, [0003].)

14. Koaizawa teaches that shaft (4 [*sic*]) is preferably formed from quartz glass. (Koaizawa 11: [0036].)

15. According to Koaizawa, shaft (4') is raised and lowered "by a raising/lowering mechanism that is not shown in the figure and is disposed above the furnace core tube (2), and is also rotated around the shaft center thereof by a rotational mechanism such as a motor that is not shown in the figures." (Koaizawa 4: [0004].)

16. The apparatus is provided with a heating furnace (8), gas supply port (9) to the furnace core tube (2), and gas exhaust port (10). (Koaizawa 4: [0003].)

17. The apparatus is also provided with an "annular furnace core tube upper seal gas supplier (12)" between top lid (3′) and the upper flange (2b) of furnace core tube (2) to seal the upper opening (2a) of the furnace core tube (2). (Koaizawa 4: [0003].)

18. According to Koaizawa, the seal between the raising/lowering shaft (4') and the top lid (3') is formed with an O-ring or by a carbon fiber member shown in JP 4-18626 (1992).[12] (Koaizawa 5: [0008].)

19. According to Koaizawa, a problem with the prior art apparatus is that the sealing function is inadequate due to thermal breakdown of the O-ring due to heat generated during treatment. (Koaizawa 5: [0009]-6: [0010].)

20. Moreover, Koaizawa states that the carbon fiber member recommended in JP 4-18626 tends to generate dust, which contaminates the preform. (Koaizawa 6: [0012].)

21. Koaizawa teaches that these problems may be solved by cooling the lid (3') (Koaizawa 8: [0022]) and by providing a

> sealing member (20) having a ring shape and formed from rubber, polytetrafluoroethylene or other resin [that] is supported on the inner circumference of the shaft passage hole (19) formed in the raising/lowering shaft passage part (3a) of the top lid (3) through which the raising/lowering shaft (4) passes, thereby allowing the raising/lowering shaft (4) to be raised and lowered while maintaining a sealed condition.

(*Id.* at 12: [0037]).

[12] JP 4-18626 does not appear to be of record in the 383 application.

22. Koaizawa describes in Figures 1 through 10 several embodiments of its invention. (Koaizawa 11: [0034] through 26: [0096].)

23. According to Koaizawa, all embodiments are described with the same designations for corresponding parts in Figure 11. (Koaizawa at 11: [0034]).

24. Koaizawa Figures 2 and 3 are shown below:

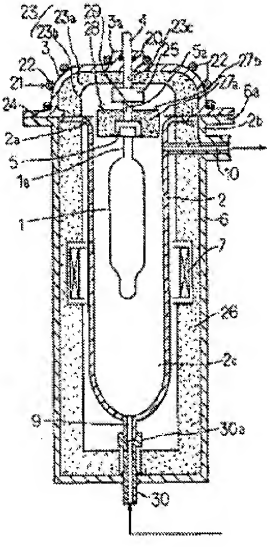

Figure 2

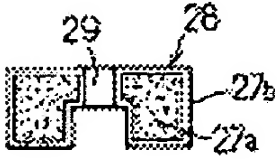

Figure 3

{Koaizawa Figures 2 and 3 are said to show an embodiment of a drying apparatus.}

25. Koaizawa Figures 2 and 3 show an embodiment that includes a heat insulating means (28) that is said to prevent transfer of radiant energy in the furnace core tube (2) to the top lid (3). (Koaizawa 16: [0057].)

26. According to Koaizawa, heat insulating means (28) is made by covering a heat insulator (27a) made from carbon felt molding or quartz wool with a quartz cover (27b). (Koaizawa 16: [0057].)

27. Koaizawa teaches that the heat insulating means (28) is provided with a passage hole (29) for shaft (4) that is also covered with quartz cover (27b). (Koaizawa 16: [0057].)

28. Koaizawa describes in Figure 10, which is shown on the next page on the right, an embodiment in which "a heat insulating means (37) that also functions as a gas shielding means shown in Figure 8 and a gas shielding means (41) are provided in a multi-heater apparatus." (Koaizawa 26: [0094]; [Figure 10 appears to erroneously show feature (28) instead of feature (37).]

29. As Koaizawa explains in slightly greater detail regarding Figure 8:

> heat insulating means (37) that also functions as a gas shielding means is disposed by supporting it on the preform holder (5) under the gas discharge port (10) in the furnace core tube (2), and the gas shielding means (41) is disposed above the gas exhaust port (10), positioned in such a manner that it does not fall below it as a result of the stopper (42) on the inner surface of the furnace core tube (2). A hole (43) for passage of the raising/lowering shaft (4) is formed at the center of this gas shielding means (41), and a passage hole (44) whereby sealing gas passes is provided in this gas shielding means (41) and a buffer chamber (45) is provided between the gas shielding means (41) and the heat insulating means (37) that also functions as a gas shielding means.

(Koaizawa 24: [0088]; emphasis added.)

{Koaizawa Figures 8 and 10 are shown below.}

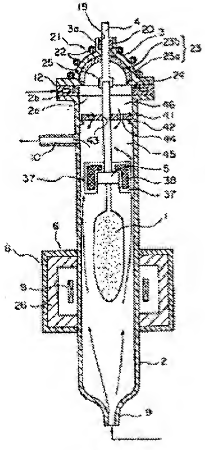

Figure 8

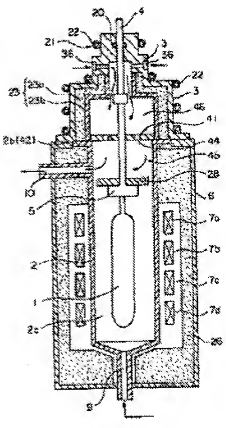

Figure 10

{Koaizawa Figures 8 and 10 are said to show a drying apparatus.}

Ryoji

30. Ryoji describes a furnace for dehydration and sintering of an optical fiber preform in which a satisfactory air-tight seal is obtained for the muffle tube by providing a lid 16 having two chambers, R_1 and R_2, one above the other, with sleeves 17 and 18 inserted in the bottoms 16a and 16b of each chamber, as shown in Ryoji Figure 2, which is reproduced on the following page:

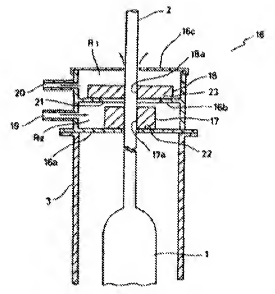

Figure 2

{Ryoji Figure 2 is said to show a drying furnace.}

31. We do not find it necessary to provide separate descriptions of the remaining references.

Arguments

Contentions and arguments of the Examiner and the Appellant are presented in numbered paragraphs, continuing from the numbered findings of fact. To distinguish the characterizations of the contentions and arguments from formal findings of fact, these paragraphs will be cited as "CC 32," etc.

The Examiner's Rejection

32. The Examiner finds that Koaizawa describes embodiments in which all elements of the claimed invention are described, but for particular dimensions recited in certain claims, and but for the washers required in claim 1. (Ans. 4-8.)

33. The Examiner explains that "[a] fair reading of JP2000-44269/Koaizawa is that one can improve preform furnaces (including the furnace of figure 11) by including any of the specific embodiments." (Ans. 13.)

34. The Examiner finds that Ryoji shows that it was known to seal muffle tubes with washers on plates. (Ans. 6.)

35. The Examiner finds further that Drouart shows a similar washer-based sealing arrangement [in a device for drawing down an optical fiber preform]. (Ans. 6, citing Drouart, feature 7, Figures 1-4.)

36. Similarly, the Examiner finds that Kaiser shows an O-ring based sealing system [about the shaft of a preform being drawn in a tubular furnace]. (Ans. 6, citing feature 27 of Kaiser Figure 2.)

37. The Examiner finds further that Gilbreath, Haney, and Collins show that O-rings and washers are recognized as equivalent sealing devices in situations where parts move relative to one another and where fluids are to be kept in or out of the sealed region. (Ans. 6, point citations omitted.)

38. The Examiner concludes that it would have been obvious to a person having ordinary skill in the art to replace the O-ring sealing arrangement described by Koaizawa by a washer arrangement as shown in the secondary references because it would have been recognized as the substitution of one known equivalent sealing method for another. (Ans. 7.)

39. The Examiner finds that Koaizawa feature (5), the preform holder, would act to restrict the flow of process gas. (Ans. 5-6.)

40. The Examiner explains further that "[a]nything that reduces the cross-section flow area of a passage would restrict a flow of gas in the passage." (Ans. 11.)

41. As such, the Examiner finds that the "flow shield" recited in claim 1 reads on Koaizawa feature (5). (Ans. 5 & 11.)

42. In the alternative, the Examiner finds that Koaizawa feature (28), shown in Figures 2 and 3 and described at Koaizawa [0034] and [0052], functions as a flow shield. (Ans. 6.)

43. The Examiner concluded that the Koaizawa disclosure is "suggestive of using the same furnace, and thus is suggestive of using feature 28." (Ans. 6.)

44. The Examiner also holds that claims 2, 5, 11, 12, 38, 41, and 42 "are clearly met" [*sic*: "would have been obvious"] (Ans. 7.)

45. Regarding the requirement of claim 2 that the flow shield defines an isolation chamber between the flow shield and the second end, the Examiner finds that the 383 Specification indicates that "the term 'chamber' need not have a complete floor." (Ans. 12.)

46. "To the degree that Koaizawa's chamber is not a 'chamber'," the Examiner argues, "the burden is on Appellant to explain why." (Ans. 12.)

47. Regarding claim 3, which requires a gap between the peripheral edge of the flow shield and the muffle to have a width between about 2.5 mm and 25 mm, the Examiner finds that "Koaizawa [0083] indicates that the means-cum-insulating means (of which 28 is one) is between 5-20 mm". (Ans. 7.)

48. Regarding claim 4, which requires that the flow shield be thicker than about 6 mm, the Examiner argues that a change in size to accommodate the hot environment and the gas flow would have been an obvious variation of size. (Ans. 8 & 12.)

49. Regarding claim 5, which requires that "the flow shield is disposed between the coupling portion and the top plate," and claims 7 [and 8], which require a spacer [at least 50 mm] between the coupling portion 134 of the handle 130 and the flow shield 160, the Examiner concedes that Koaizawa feature (5), the coupling element, does not satisfy these limitations. (Ans. 13.)

50. However, the Examiner argues the claims remain obvious in view of Koaizawa feature (28), which the Examiner had also identified as a flow shield, and which the Examiner notes, Bookbinder does not dispute. (Ans. 13.)

51. Regarding claims 39 and 40, which require a drive assembly operable to rotate the handle and the flow shield relative to the muffle, the Examiner refers to Koaizawa [0004]. (Ans. 8.)

Bookbinder's Rebuttal

52. Bookbinder argues that the Examiner's rejections fail because it is error to find that washers and O-rings perform equivalent functions in the furnaces taught by Koaizawa. (Br. 5-8.)

53. In particular, Bookbinder cites a definition from *Webster's Third New International Dictionary* (1993) indicating that O-rings are used to seal against high pressures. (Br. 6.)

54. In contrast, according to Bookbinder, washers are not appropriate for sealing against high pressure, so the equivalence found by the Examiner is not pertinent in the present case. (Br. 6-7.)

55. More specifically, Bookbinder argues, whereas the system described by Koaizawa is intended to provide excellent seals at high pressure, the system described by Ryoji "is a leaky system allowing some exhaust gas to exit around the washer." (Br. 8.)

56. Moreover, Bookbinder argues that the identification of Koaizawa feature (5) as a flow shield is erroneous because it "does not extend across the furnace enough to restrict flow of the process gas, and in fact only serves to hold the optical fiber p[re]form in place." (Ans. 9.)

57. Accordingly, Bookbinder concludes, the Examiner's rejection of claims 1, 41, 42, 47, and 48 for obviousness must be reversed. (Ans. 9.)

58. Bookbinder presents arguments for the separate patentability of each of claims 2-5, 7-9, 39, and 40. (Br. 9-10.)

59. According to Bookbinder, "there is clearly no formation of an isolation chamber 102 between the p[re]form holder 5 in Koaiza[w]a and the second end." (Br. 9.)

60. With regard to claim 3, Bookbinder argues that "there is clearly no suggestion of using element 28 in the apparatus disclosed in Fig. 1, as the Examiner proposes in his rejection." (Br. 9.)

61. Bookbinder denies that there is any mention or suggestion in the prior art that the flow shield have a thickness greater than 6 mm, as required by claim 4. (Br. 9.)

62. With respect to claim 5, Bookbinder argues that because the flow shield cannot be positioned between itself and something else, Koaizawa feature (5) cannot be the flow shield. (Br. 9-10.)

63. Bookbinder does not address the rejection of claim 5 in light of Koaizawa feature (28).

64. With respect to claim 7, which requires a spacer between the flow shield and the coupling portion of the handle, Bookbinder submits that nothing in Koaizawa Figure 10 would motivate one of skill in the art to modify the apparatus shown in Figure 1 to include a spacer which separates the flow shield from the coupling portion. (Br. 10.)

65. Similarly, with regard to claim 8, Bookbinder argues there is nothing to suggest that the spacing distance should be at least about 50 mm. (Br. 10.)

66. With regard to claim 9, which specifies various refractory materials for the flow shield, Bookbinder objects that the reference in Koaizawa to insulating means 28 is irrelevant because "there is no motivation to use insulating means 28 in the Fig. 1 embodiment. Nor is there any mention of combining the teachings of the Fig. 6 embodiment with that of the prior art Fig. 1 embodiment." (Br. 10.)

67. With respect to claims 39 and 40, Bookbinder refers to Figure 20 (of the 257 patent) and objects that there is nothing to suggest that Figure 1 should be modified. (Br. 10.)

68. Bookbinder does not respond to the Examiner's citation, in the second Answer, of the teachings in Koaizawa [0004].

C. Discussion

On appeal, the burden is on Bookbinder, as the Appellant, to prove reversible error in the Examiner's rejection for obviousness. *In re Kahn*, 441 F.3d 977, 985-86 (Fed. Cir. 2006) ("On appeal to the Board, an applicant can overcome a rejection [under § 103] by showing insufficient evidence of prima facie obviousness or by rebutting the prima facie case with evidence of secondary indicia of nonobviousness.") (quoting *In re Rouffet*, 149 F.3d 1350, 1355 (Fed. Cir. 1998)).

Bookbinder has not complained of any new positions taken by the Examiner to which it has not had a full and fair opportunity to respond. In particular, Bookbinder did not take the opportunity to respond to the second Examiner's Answer with a Reply Brief, in spite of some differences apparently necessitated by differing descriptions in Koaizawa and the 257 patent. (See, e.g., CC 67, 68.) Under these circumstances, however, it is clear that Bookbinder has been given notice twice of the Examiner's complete position regarding the rejection of the claimed subject matter. Accordingly, we shall consider the entire second Examiner's Answer as setting out the prima facie case for obviousness.

The Examiner finds that Koaizawa describes all elements recited in the claims but for the washers as a sealing device. (CC 32.) Moreover, the Examiner finds that it would have been obvious to a person having ordinary skill in the art that elements from various embodiments described by Koaizawa could be combined to obtain further useful furnaces. (CC 33.) As for the missing sealing washers, the Examiner finds that washers were used by Ryoji and by Drouart in similar preform-treating devices to perform a

similar sealing function. (CC 34-35.) Moreover, the Examiner finds the record shows other instances in which O-rings and washers are treated as equivalents for making mobile seals against fluids. (CC 36, 37.) Accordingly, the examiner concluded that the subject matter of claim 1 would have been obvious. (CC38.)

Bookbinder raises two major arguments against the Examiner's rejection of claim 1. The broadest argument is that there is no support for modifying the device in Koaizawa Figure 11 with various features found elsewhere in Koaizawa (e.g., CC 60, 64, 66, 67) or in other references (e.g., CC54). The most specific version of this argument—and Bookbinder's principal contention—is that the Examiner erred in asserting the equivalence of washers and O-rings in Koaizawa's devices. (CC 52-55.) Bookbinder's second major argument is that the Examiner erroneously identified Koaizawa feature (5), the preform holder, as a flow shield. (CC 56.)

The basis of Bookbinder's broad argument appears to be that the Examiner's proposed modifications of Figure 11 are counter to the invention taught by Koaizawa and hence would not have been obvious. Bookbinder regards the main invention of Koaizawa as being directed to providing a tight sealing means for high pressure muffle tube furnaces. (CC55.) This characterization is not, in our view, unreasonable, considering the principal solutions to the problems of the prior art addressed by Koaizawa. (See FF 21.) However, we find no suggestion in the Examiner's rejection that the Examiner relies on the main invention of Koaizawa as evidence of obviousness. Thus, Bookbinder's broad and principal arguments are misplaced.

We understand the Examiner to argue that it would have been obvious to modify the prior art device shown in Figure 11 with the various holders (5) and heat shields (28) and (41) shown in Koaizawa Figures 1, 2, 3, 6, and 19, as well as in the remaining Figures. Such modifications of the prior art apparatus would have been expected to be at least as useful as the unmodified prior art apparatus. That Koaizawa teaches further improvements does not detract from the Examiner's analysis. A reference is useful for all it teaches to those skilled in the art. *In re Heck*, 699 F.2d 1331, 1333 (Fed. Cir. 1983) ("The use of patents as references is not limited to what the patentees describe as their own inventions or to the problems with which they are concerned. They are part of the literature of the art, relevant for all they contain.") Moreover, it has long been recognized that eliminating (or, as here, declining to adopt) an element, with the consequent loss of that element's function or advantage, can be an obvious variation provided that the modified apparatus remains useful. *See*, e.g., *In re Kuhle*, 526 F.2d 553, 555 (CCPA 1975) (deletion of a switch member and other elements with deletion of function was an obvious expedient). The Examiner's reliance on Koaizawa's teachings of the prior art and some, but not all of the "improvements" taught by Koaizawa does not "destroy" the reference because there is no teaching in Koaizawa that the principal improvements—the improved O-ring seal and the cooled cap—would be ineffective without the secondary improvements, and vice-versa.

We therefore reject Bookbinder's arguments (as applied explicitly to claims 3, 9, 39, and 40) that there is no suggestion to combine elements from various embodiments described by Koaizawa. In each case, the weight of the evidence is that the ordinary worker would have had a reasonable

expectation of achieving a drying and treatment apparatus suitable for the purposes of the prior art.

Bookbinder's argument that the Examiner erroneously found that washers are equivalent to O-rings is misdirected because that argument is also based on the misapprehension that the Examiner proposed that the modification of Koaizawa's improvement would have been obvious. As explained *supra*, the Examiner determined that modification of the prior art, which taught an O-ring seal, would have been obvious given the equivalent use of washers in similar devices as shown by Ryoji and by Drouart. These references, in our view, suffice to establish the equivalence for the Examiner's rejection. Bookbinder's reliance on *Webster's* is not persuasive for several reasons. First, *Webster's* is a general, non-technical dictionary. As such, the examples it provides are generally instructive, but they are not persuasive that O-rings and washers are mutually exclusive solutions for sealing fluid connectors that can move with respect to one another. Moreover, we accord far more weight to the examples cited *supra*, provided by the Examiner, [13] and to the teachings of Koaizawa (FF 18, 19) and Kaiser (CC 36) showing that O-rings have been used to effect a seal between the preform supporting handle and the top lid of a muffle tube type furnace for preforms.

Bookbinder's last major argument, that the Examiner erred in finding that the flow shield recited in the claims reads on Koaizawa preform holder (5), is without merit. Claims, and limitations within claims, are given

[13] On review of the references cited by the Examiner in CC 35-37, we find the Examiner's contentions to be well-supported, and we adopt the Examiner's findings as our own.

"the broadest reasonable meaning of the words in their ordinary usage as they would be understood by one of ordinary skill in the art, taking into account what ever enlightenment by way of definitions or otherwise that may be afforded by the written description contained in the applicant's specification." *In re Morris*, 127 F.3d 1048, 1054 (Fed. Cir. 1997). Bookbinder has not directed our attention to any definition of the term "flow shield" that is more limiting than the one proposed by the Examiner, who found that "[a]nything that reduces the cross-section flow area of a passage would restrict a flow of gas in the passage" (Ans. 11). Because Koaizawa holder (5) has significant lateral dimensions—in the language of claim 1 it "extend[s] across the furnace passage between the handle and the muffle tube"—it restricts the flow of gas in the passage. Therefore, with the exception of claims 5, 7, and 8, Koaizawa holder (5) meets the flow shield limitation in all of Bookbinder's claims.

The Examiner also identified Koaizawa feature 28 as meeting the flow shield recited in Bookbinder's claims, including claims 5, 7, and 8. (CC 42, 50.) Bookbinder has not disputed this conclusion, and has therefore failed to show reversible error in this part of the Examiner's rejection.

Regarding claim 2, Bookbinder's assertion that "there is clearly no formation of an isolation chamber 102 between the p[re]form holder 5 in Koaiza[w]a and the second end" (Br. 9; CC 59) is not supported by citation of credible evidence regarding the definition of the term "chamber" in the 383 Specification, nor by a reasoned explanation. Thus, Bookbinder's conclusory argument is not persuasive of error.

Similarly, Bookbinder's arguments regarding the dimensions recited in claims 4 (CC 61) and 8 (CC 65) are unsupported by citation to credible evidence of record. Nor has Bookbinder directed our attention to any credible evidence that the dimensions of shield (28) or the distance between shield (41) and the holder (5) in Koaizawa are critical (and therefore could not be varied), or that the dimensions are critical to the subject matter covered by Bookbinder's claims (and therefore produce unexpected results). We conclude that Bookbinder has failed to prove reversible error in the Examiner's rejection of these claims as well.

D. Summary

In view of the record and the foregoing considerations, it is:

ORDERED that the rejection of claims 1-12, 38-42, 47, and 48 under 35 U.S.C. § 103(a) in view of the combined teachings of Koaizawa, Drouart, Kaiser, Ryoji, Gilbreath, Haney, and Collins is AFFIRMED;

FURTHER ORDERED that no time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED

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Corning Incorporated
SP-TI-3-1
Corning, NY 14831